A Relational Model of How High-Performance Work Systems Work

Jody Hoffer Gittell  
The Heller School for Social Policy and Management, Brandeis University, Waltham, Massachusetts 02454,  
jgittell@brandeis.edu

Rob Seidner  
College of Urban Planning and Public Affairs, University of Illinois at Chicago, Chicago, Illinois 60607,  
seidner@alumni.brandeis.edu

Julian Wimbush  
Health Services and Policy Analysis Program, University of California, Berkeley, Berkeley, California 94270,  
wimbush@berkeley.edu

In this paper we explore a causal mechanism through which high-performance work systems contribute to performance outcomes. We propose that high-performance work systems can improve organizational performance by strengthening relationships among employees who perform distinct functions, a pathway that is expected to be particularly important in settings characterized by highly interdependent work. In a nine-hospital study of patient care, we identify high-performance work practices that positively predict the strength of relational coordination among doctors, nurses, physical therapists, social workers, and case managers, in turn predicting quality and efficiency outcomes for their patients. Relational coordination mediates the association between these high-performance work practices and outcomes, suggesting a relational pathway through which high-performance work systems work.

Key words: high-performance work systems; relational coordination; patient care

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Introduction

One of the core principles of strategic human resource management is that organizational performance is influenced by the way employees are managed. In support of this argument, certain sets of human resource practices have been found to improve employee effectiveness and to predict higher levels of organizational performance (Bailey et al. 2001, Ramsey et al. 2000; see also reviews by Becker and Gerhart 1996, Ichniowski et al. 1996). Researchers have documented the impact of human resource practices on efficiency outcomes such as worker productivity (Arthur 1994, Bartel 1994, Datta et al. 2005, Koch and McGrath 1996) and equipment reliability (Ichniowski et al. 1997, Youndt et al. 1996), on quality outcomes such as manufacturing quality (MacDuffie 1995) and patient mortality (West et al. 2002), and on business growth (Bartel 2004) and financial performance (e.g., Collins and Smith 2006, Delery and Doty 1996, Huselid 1995, Wright et al. 2006). Human resource practices have also been found to explain performance differences among steel-finishing lines (Ichniowski et al. 1997), call centers (Batt 1999), airlines (Gittell 2001), banks (Richard and Johnson 2004), and high-tech firms (Collins and Clark 2003), though some studies have found no performance differences associated with human resource practices (e.g., Cappelli and Neumark 2001).

Multiple labels have been applied to this basic argument, including high-performance work systems, high-commitment work systems, high-involvement work systems, and high-performance human resource management. Despite these different labels, their common thread is that organizations can achieve high performance by adopting practices that recognize and leverage employees’ ability to create value. Though some disagreement remains among researchers, it is generally agreed that these practices include selection, training, mentoring, incentives, and knowledge-sharing mechanisms (Horgan and Muhlau 2006) and that these practices are most effective when they are implemented in bundles because of their combined effects on performance (Batt 1999, Dunlop and Weil 1996, Ichniowski et al. 1997, Laursen 2002, MacDuffie 1995).

There is less agreement, however, regarding the causal mechanisms through which high-performance work systems influence performance outcomes. The two dominant arguments are based on human capital and skill on the one hand, and motivation and commitment on the other. In addition, there is an emerging view that employee–employee relationships constitute a third causal mechanism through which high-performance work systems influence performance outcomes (Delery and Shaw 2001). Rather than focusing primarily on the knowledge...
and skills of employees or on the commitment of employees to their organization, this third view focuses on relationships between employees as the primary causal mechanism that connects high-performance work systems and performance outcomes (e.g., Collins and Clark 2003, Collins and Smith 2006).

In this paper we adopt this third view and propose a model of high-performance work systems in which each component practice reaches across multiple functions to engage employees in a coordinated effort. All the high-performance work practices identified in this study are focused on building employee-employee relationships. We argue that these high-performance work practices contribute to performance by supporting the development of relational coordination, a mutually reinforcing web of communication and relationships carried out for the purpose of task integration (Gittell 2002b).

We test our model with multilevel data from a nine-hospital study of patient care that includes administrator interviews to measure work practices, provider surveys to measure relational coordination, and patient surveys to measure patient outcomes. We explore the effects of these high-performance work practices on quality and efficiency outcomes for patients and the mediation of these effects through relational coordination among care providers. Hospitals are notorious for operating with well-defined silos that engender turf battles between them. We expect that relational coordination will be critical for achieving desired performance outcomes in this setting due to the high levels of task interdependence, uncertainty, and time constraints found there (Gittell 2000). We expect these high-performance work practices will foster relational coordination, thus bridging the boundaries between the distinct professions that are responsible for carrying out the work.

Human Capital and Commitment Models of How High-Performance Work Systems Work

Models of high-performance work systems often draw on human capital theory, whose central implication is that human resource practices can improve organizational performance by increasing the knowledge and skills of employees (Becker 1975). To be successful, firms must invest in and maintain the workforce just as they invest in and maintain the capital infrastructure. Researchers have found that companies can achieve sustained performance advantages by leveraging the knowledge of their employees. High-performance work systems can foster the development of human capital in the form of firm-specific idiosyncratic skills (Gibbert 2006), creating a performance advantage for organizations (Fried and Hisrich 1994, MacMillan et al. 1987, Tyebjee and Bruno 1984) through processes such as increased employee problem solving (Snell and Dean 1992) and improved customization by employees in service industries (Batt 2002).

Others have argued that in addition to building the knowledge and skills of employees, high-performance work systems also enhance the motivation and commitment of employees. Commitment-based human resource practices create an organizational climate that motivates employees to act in the best interest of the organization, thus enhancing performance (Appelbaum et al. 2000, Arthur 1992, Osterman 1988, Rousseau 1995). A key argument in this literature is that human resource practices build a psychological contract by signaling an employer’s commitment to a long-term relationship, in turn yielding a long-term commitment from the employee (Tsui et al. 1997). Consistent with this argument, studies have found that particular work practices are associated with higher levels of commitment (e.g., Tsui et al. 1997, Whitener 2001) and that commitment in turn is positively associated with performance. In particular, Bowen and Ostroff (2004) provide arguments suggesting that motivation and discretionary effort underlie the association between human resource practices and performance and are triggered by a strong human resource system. Note that the human capital and commitment pathways are not mutually exclusive. Although research and theory often focus on one or the other, some theorists have argued that high-performance work systems can contribute to performance through both pathways (e.g., Appelbaum et al. 2000).

Relational Models of How High-Performance Work Systems Work

Relationships among employees have also been theorized to play a role in achieving high levels of organizational performance. Some scholars have made this argument by drawing on the concept of organizational social capital, a type of social capital that exists in and can be developed by organizations as a distinctive organizational capability and source of competitive advantage (Leana and Van Buren 1999, Nahapiet and Ghoshal 1998). Organizational social capital has been shown to improve performance by enabling employees to access the resources that are embedded within a given network and by facilitating the transfer and sharing of knowledge (Levin and Cross 2004, Tsai and Ghoshal 1998).

Other theorists have argued that employee-employee relationships are important for coordinating work (Adler et al. 2008, Faraj and Sproull 2000, Gittell 2000), based on the argument that coordination is the management of task interdependence (Malone and Crowston 1994) and therefore fundamentally a relational process (Beckky 2006, Faraj and Sproull 2000, Gittell 2002b, Weick and Roberts 1993). One of these relational perspectives—relational coordination—identifies specific dimensions of relationships that are integral to the coordination of work. According to the theory of relational coordination, coordination that occurs through frequent, high-quality communication supported by relationships of
shared goals, shared knowledge, and mutual respect enables organizations to better achieve their desired outcomes (Gittell 2006). Defined as “a mutually reinforcing process of interaction between communication and relationships carried out for the purpose of task integration” (Gittell 2002a, p. 301), relational coordination is a type of employee-employee relationship that is particularly relevant for coordinating work that is highly interdependent, uncertain, and time-constrained.

Substantial progress has been made toward identifying the work practices through which organizations influence the development of employee-employee relationships. Leana and Van Buren (1999) argue that stable employment relationships and reciprocity norms facilitate the formation of social capital among employees. Evans and Davis (2005) argue that work practices such as selective staffing, self-managed teams, decentralized decision making, extensive training, flexible job assignments, open communication, and performance-contingent compensation influence multiple dimensions of an organization’s social structure, including the development of bridging ties, norms of reciprocity, shared mental models, role making, and organizational citizenship behavior. Gittell (2000) argues that work practices such as cross-functional selection, cross-functional conflict resolution, cross-functional performance measurement, flexible job design, and cross-functional boundary spanner roles can foster the development of relational coordination. These work practices were shown to predict significantly higher levels of relational coordination among airline employees from 12 distinct functions who were engaged in the flight departure process, though their impact on performance was not explored.

Similarly, Gant et al. (2002) show that on steel-finishing lines with high-performance work systems, defined as selection, training, incentive pay, job design, problem-solving teams, and extensive labor/management communication, production employees have denser communication networks with each other and that these steel-finishing lines also exhibit higher performance, measured in terms of fewer delays and higher yields. They argue that these human resource practices influence performance outcomes because they influence the social networks of production employees. Their results suggest that social networks may mediate the link between work practices and outcomes, though mediation was not demonstrated.

Collins and Clark (2003) have provided one of the best empirical tests to date of the argument that human resource practices influence outcomes through their impact on relationships among employees. They argue that the social networks of top management teams enhance a firm’s information-processing capability and that human resource practices, including mentoring, incentives, and performance appraisals, can be designed to encourage the development of these social networks. They then demonstrate that the impact of these high-performance work practices on firm performance is mediated by the strength of firms’ top management team social networks. More recently, Vogus (2006) has argued that high-performance work practices such as selection, training, performance appraisal, performance-based rewards, and job security contribute to high-quality interactions and mindfulness by signaling to employees the importance of relationships. Vogus continues by postulating that these high-quality interactions contribute to higher-quality outcomes for hospital patients. Empirical tests of this model demonstrated mediation.

Though the types of employee-employee relationships explored in these studies are varied, including relational coordination (Gittell 2000), social networks (Collins and Clark 2003, Gant et al. 2002), social capital (Evans and Davis 2005, Leana and Van Buren 1999), and mindful interacting (Vogus 2006), these studies suggest that high-performance work practices can enhance performance through the pathway of employee-employee relationships.

**Theory Building**

The work practices found in the studies described above resemble in many ways the work practices found in the earlier high-performance work systems literature—they include selection, training, performance measurement, rewards, knowledge-sharing mechanisms, and so on. But they differ in an important way. Although the work practices found in these studies have the potential to influence employee skills and commitment, they are focused primarily on strengthening relationships between employees. This understanding of high-performance work practices therefore responds implicitly to an argument by post-bureaucracy theorists that traditional work practices often create divisions between employees even when relationships are critically important due to the need for coordination (Heckscher 1994, Piore 1993). According to Piore (1993, p. 15), the bureaucratic organizational practices that have become widespread through the rise of Taylorism “have pushed us to restrict communication among the people responsible for the way in which the different parts are performed.” Heckscher (1994, p. 24) envisions a postbureaucratic, interactive organizational form in which “everyone takes responsibility for the success of the whole” and in which “workers need to understand the key objectives in depth in order to coordinate their actions intelligently ‘on the fly’.”

**High-Performance Work Practices as Predictors of Relational Coordination.** Rather than rejecting the role of formal work practices as the postbureaucratic literature has tended to do, we argue that formal work practices can be redesigned to foster the employee-employee relationships through which work is effectively coordinated “on the fly.” High-performance work practices can...
serve to overcome the silos of bureaucratic organizations by connecting employees directly with each other to enable them to coordinate their work. We focus here on six high-performance work practices—cross-functional selection, cross-functional conflict resolution, cross-functional performance measurement, cross-functional rewards, cross-functional meetings, and cross-functional boundary spanners—and their impact on relational coordination, reflected in the frequency, timeliness, accuracy, and problem-solving nature of communication among employees and the degree to which their relationships are characterized by shared goals, shared knowledge, and mutual respect.

Selection has long been recognized as a powerful way to achieve fit between a prospective employee and a job (Lawrence and Lorsch 1968). Though selection traditionally focused on skills, other attributes such as personality traits (Day and Silverman 1989), organizational fit (Kwiatkowski 2003), and teamwork ability (Cappelli and Rogovsky 1994) are also relevant to job performance. In the context of highly interdependent work, selection for cross-functional teamwork is expected to be particularly relevant and has been found to affect coordination across functional boundaries (Gittell 2000), in particular strengthening the mutual respect dimension of relational coordination.

Conflicts are likely to occur in the presence of high levels of task interdependence and/or diversity—including functional diversity—among participants (Pelled et al. 1999, Walton and Dutton 1967). Conflicts have been found to improve performance when they take place in a group that values task-related conflict; however, unresolved conflicts undermine relationships and hinder performance over time (Jehn 1995). Cross-functional conflict resolution can play a constructive role by providing a way to articulate and accommodate multiple points of view, each with the potential to add value to the work process. Consistent with this argument, conflict resolution has been found to provide opportunities for building a shared understanding of the work process among participants, thereby strengthening the relationships through which coordination is carried out (Gittell 2000, Mareschal 2003), in particular strengthening the shared knowledge and mutual respect dimensions of relational coordination.

Traditional performance measurement practices assign accountability for outcomes to individuals or functions, despite the task interdependencies that often make outcomes the responsibility of a larger group. This focus on individual or functional accountability encourages subgoal optimization (March and Simon 1958), whereas cross-functional accountability encourages workers to adopt a broader perspective and to focus on problem solving rather than the assignment of blame (Chenhall 2005, Deming 1986, Locke and Latham 1990). Performance measurement practices that focus on problem solving have been found to strengthen working relationships, while the reactive assignment of blame has been found to undermine those relationships (Edmondson 1996). In particular, these cross-functional performance measurement practices strengthen the shared goals and problem-solving communication dimensions of relational coordination.

Likewise, rewards have traditionally been tied to individual or functional outcomes, thereby encouraging subgoal optimization at the expense of organizational outcomes. Employees engaged in interdependent tasks are most likely to coordinate their tasks effectively if their rewards are also interdependent (Wageman and Baker 1997). But because rewards are often put in place without a clear understanding of how they are expected to work, misalignment is common. Research indicates that more individualized rewards are associated with lower levels of integration across units, whereas shared rewards have been found to support coordination and goal commitment among parties involved in the same work process (Guthrie and Hollensbe 2004, Zenger and Hesterly 1997). In particular, cross-functional rewards strengthen the shared goals dimension of relational coordination.

Meetings are a coordinating mechanism that fosters real time coordination, incorporating information as it becomes available (Argote 1982). Meetings give participants the opportunity to coordinate their tasks interactively, on the spot. Face-to-face interactions are expected to have particular relevance for assuring effective communication because of their high bandwidth, their immediacy, and their ability to build connections among participants through the use of nonverbal cues (Goffman 1961, Nohria and Eccles 1992). While informal meetings are sometimes argued to be more effective than formal meetings (Mangrum et al. 2001), formal meetings may be needed to connect participants who work in distinct functions. In particular, cross-functional meetings strengthen the accuracy of communication as well as the shared goals and mutual knowledge dimensions of relational coordination.

Boundary spanners are staff members whose primary task is to integrate the work of other people around a project, process, or customer (Galbraith 1995, Lawrence and Lorsch 1968). Because boundary spanners enable new information to be incorporated on an ongoing basis, they are typically used when tasks cannot be fully programmed in advance. Because they build understanding between areas of functional expertise, they are expected to add value when existing boundaries are highly divisive (Galbraith 1995, Mohrman 1993). In particular, cross-functional boundary spanners strengthen the frequency and timeliness of communication as well as the shared knowledge dimensions of relational coordination.

In summary, the high-performance work practices described above are expected to foster relational coordination, which is reflected in the frequency, timeliness,
accuracy, and problem-solving nature of communication among employees and the degree to which their relationships are characterized by shared goals, shared knowledge, and mutual respect. We know from previous research that “firms can improve performance either by increasing the number of practices they employ within the system or by using the practices in an AR system in a more comprehensive and widespread manner” (Youndt et al. 1996, p. 849) Relational coordination therefore depends not only on the adoption of high-performance work practices, but also on the intensity of their adoption and the degree to which they reach across all relevant employee functions. Our concept of high-performance work practices therefore reflects (1) the number of work practices that are adopted, (2) the intensity of their adoption, and (3) the degree to which they reach across all relevant employee functions, together summarized as the strength of high-performance work practices.

**Hypothesis 1.** The strength of high-performance work practices positively predicts relational coordination among employees.

**High-Performance Work Practices and Relational Coordination as Predictors of Quality and Efficiency Performance.** Through their impact on relational coordination, high-performance work practices are expected to improve quality and efficiency performance for organizations. Previous research has shown how relationships of shared goals, shared knowledge, and mutual respect enabled employees from different functions to coordinate work by supporting frequent, timely, problem-solving communication among them (Gittell 2006). Relational coordination is expected to result in fewer missed signals between employees with different areas of functional expertise, due to the information-processing capacity that is created through shared goals, shared knowledge, and mutual respect. Relational coordination enables more consistent communication and a reduction in the probability of errors, leading to higher-quality outcomes. Because high-performance work practices strengthen relational coordination among employees, we expect the association between high-performance work practices and quality outcomes to be mediated by relational coordination.

**Hypothesis 2.** The association between high-performance work practices and quality outcomes is mediated by relational coordination among employees.

In the same way, high-performance work practices are also expected to improve efficiency outcomes for organizations. Because relational coordination results in fewer missed signals between employees, it is expected to reduce the time that is wasted carrying out redundant communication, searching for missing information, and waiting to hear from coworkers. Relational coordination thus enables organizational resources—including staff, facilities, and equipment—to be utilized more productively, leading to more efficient outcomes such as faster turnaround times and shorter throughput times. Because high-performance work practices strengthen relational coordination among employees, we expect the association between high-performance work practices and efficiency outcomes to be mediated by relational coordination.

**Hypothesis 3.** The association between high-performance work practices and efficiency outcomes is mediated by relational coordination among employees.

Together, these hypotheses serve as the basis for a relational model of how high-performance work systems work.

**Methods**

**Setting**

To test these hypotheses, a study of patient care was conducted using a convenience sample of nine major urban hospitals. Previous studies have shown that coordination between care providers is positively related to both quality and efficiency. Specifically, coordination is associated with provider-perceived (Argote 1982) and patient-perceived quality of care (Gittell 2000), and with reduced lengths of hospital stay (Gittell et al. 2000, Shortell et al. 1994). However, the contribution of high-performance work practices to these outcomes and to the coordination of care has not been explored. We chose a work process for which outcomes were well understood and readily measured—surgical care for joint replacement patients. We selected nine orthopedics units, each located in a different hospital that performed relatively large numbers of joint replacements. In each orthopedics unit, there was a group of care providers—including physicians, nurses, physical therapists, case managers, and social workers—who were responsible for providing care to joint replacement patients over a six-month study period.

**Data Sources**

Data from the participating orthopedics units included administrator interviews, a care provider survey, a patient survey, and patient hospitalization records. Administrator interviews were used to measure high-performance work practices at the unit level. The care provider survey was used to measure relational coordination at the level of individual care providers. Patient surveys and hospitalization records were used to measure outcomes at the level of individual patients. To measure high-performance work practices, front-line administrators were interviewed in each orthopedics department, including at least one physician, nurse, physical therapist, social worker, and case manager. For each unit, unstructured interviews and observations were conducted in person at
the time of the initial site visits, followed up by more systematic structured telephone interviews after the site visits. The interview protocol that we developed based on our first stage of interviews and observations was used as a guide for our second stage of interviews.

To measure relational coordination, surveys were mailed to all eligible care providers in the nine orthopedics units who had responsibilities for joint replacement patients during the study period in five core functions: physicians, nurses, physical therapists, social workers, and case managers. A unit administrator designated by the chief of orthopedics identified all eligible care providers in each unit. The administrator received written guidelines as to whom should be included (all providers from the above five functions who were directly or indirectly involved with providing care for joint replacement patients). Surveys were mailed to all eligible care providers initially during the second month of the study period, with one repeat mailing during the study period for nonrespondents. Responses were received from 338 of 666 providers for an overall provider response rate of 51%.

To measure patient outcomes, the patient survey was adapted from a validated instrument that is widely used to assess the quality of care in health care settings (Cleary et al. 1991). We received responses to 878 of 1,367 questionnaires sent to patients in the target population—patients with a diagnosis of osteoporosis who received primary unilateral hip or knee replacement in one of the nine hospitals during the six-month study period—for a response rate of 64%. In addition, hospital administrators provided hospitalization records for each patient. These records were used to determine length of stay for each patient and to extract information regarding patient characteristics to use as control variables in models of quality and efficiency outcomes. Of the 878 survey respondents, 69 were dropped because they failed to meet one or more conditions of the study (primary unilateral hip or knee replacement with a diagnosis of osteoporosis), leaving 809 viable respondents. Of these, all 809 respondents had full data available for the variables taken from the hospitalization records (age, race, gender, surgical type, length of stay), but some had missing data on the patient survey variables. The number of respondents with complete responses for the quality outcome models was \( n = 588 \) and for the efficiency outcome models was \( n = 599 \). Testing for missing data bias, we found that respondents who were excluded from our final models were older, more likely to be female, and had lower levels of preoperative functioning, but that they did not differ significantly on any of the other variables in our models, including quality of care or length of stay.

High-Performance Work Practices
High-performance work practices included in this study were cross-functional selection, cross-functional conflict resolution, cross-functional performance measurement, cross-functional rewards, cross-functional team meetings, and cross-functional boundary spanners. Descriptive data for these work practices are shown in Table 1.

Selection was measured by asking administrators in each orthopedics unit about selection criteria for physicians, nurses, and physical therapists, probing as to whether cross-functional teamwork ability was considered an important selection criterion. This variable was coded from 0 to 2 for each of these three workgroups, 0 indicating that cross-functional teamwork ability was not considered, 1 indicating that it was considered to some extent, and 2 indicating that it was a consistent criterion for selection.

Conflict resolution was measured by asking about conflict-resolution processes. Questions probed as to whether any formal cross-functional conflict resolution process was in place for physicians, nurses, or physical therapists. This variable was coded 0 or 1 for physicians, nurses, and physical therapists; 0 indicated that the workgroup had no access to a formal cross-functional conflict resolution process and 1 indicated that the workgroup did have access.

Performance measurement was measured by asking about the quality-assurance process and the utilization review process in each hospital, probing as to whether each of these processes were largely focused on identifying the single function that was responsible for a quality or utilization problem or whether the approach was more cross-functional. Responses were coded on a 5-point scale, where 1 = highly functional, 2 = fairly functional, 3 = equally functional/cross-functional, 4 = fairly cross-functional, and 5 = highly cross-functional. Questions also probed interviewees as to whether these two performance-measurement processes were reactive (focused on affixing blame) or proactive (focused on problem solving). Responses were coded on a 5-point scale: 1 = highly reactive, 2 = fairly reactive, 3 = equally reactive/proactive, 4 = fairly proactive, and 5 = highly proactive.

Rewards were measured by asking about the criteria for rewards for physicians, nurses, and physical therapists, probing as to whether rewards were based purely on individual performance or whether they were based on some cross-functional performance criteria as well. This variable was coded from 0 to 2. For nurses and physical therapists, 0 indicated no performance-based rewards, 1 indicated individual rewards only, and 2 indicated some cross-functional team rewards. For physicians, 0 indicated individual rewards only, 1 indicated surplus sharing with the hospital (potential for sharing positive financial outcomes), and 2 indicated risk sharing with the hospital (potential for sharing both positive and negative financial outcomes).

Meetings were measured by asking key informants about participation in physician rounds and nursing
Cross-functional performance measurement
- Cross-functional approach to quality measurement
  - Factor loading: 0.544
  - Range: 1–5
  - Mean: 3.33
  - SD: 1.41
  - No. of observations: 9
- Problem-solving approach to quality measurement
  - Factor loading: 0.729
  - Range: 1–5
  - Mean: 2.78
  - SD: 1.39
  - No. of observations: 9
- Cross-functional approach to efficiency measurement
  - Factor loading: 0.834
  - Range: 1–5
  - Mean: 3.00
  - SD: 1.58
  - No. of observations: 9
- Problem-solving approach to efficiency measurement
  - Factor loading: 0.878
  - Range: 1–5
  - Mean: 3.02
  - SD: 1.43
  - No. of observations: 9

Cross-functional meetings
- Nurses included in physician rounds
  - Factor loading: 0.548
  - Range: 0–2
  - Mean: 1.33
  - SD: 0.87
  - No. of observations: 9
- Physical therapists included in physician rounds
  - Factor loading: 0.691
  - Range: 0–2
  - Mean: 0.56
  - SD: 0.88
  - No. of observations: 9
- Case managers included in physician rounds
  - Factor loading: 0.677
  - Range: 0–2
  - Mean: 0.67
  - SD: 0.87
  - No. of observations: 9
- Physicians included in nursing rounds
  - Factor loading: −0.210
  - Range: 0–2
  - Mean: 0.78
  - SD: 0.44
  - No. of observations: 9
- Physical therapists included in nursing rounds
  - Factor loading: −0.112
  - Range: 0–2
  - Mean: 1.44
  - SD: 0.73
  - No. of observations: 9
- Case managers included in nursing rounds
  - Factor loading: 0.642
  - Range: 0–2
  - Mean: 1.33
  - SD: 1
  - No. of observations: 9

Cross-functional boundary spanners
- Case manager caseload
  - Factor loading: −0.740
  - Range: 6.7–40
  - Mean: 26.30
  - SD: 10.80
  - No. of observations: 9
- Case manager discharge planning role
  - Factor loading: 0.515
  - Range: 0–1
  - Mean: 0.89
  - SD: 0.33
  - No. of observations: 9
- Case manager coordination role
  - Factor loading: 0.368
  - Range: 0–1
  - Mean: 0.44
  - SD: 0.53
  - No. of observations: 9
- Primary nursing model
  - Factor loading: 0.746
  - Range: 0–1
  - Mean: 0.56
  - SD: 0.53
  - No. of observations: 9

High-performance work practices index (α = 0.93)

Relational coordination
- Shared goals
  - Factor loading: 0.629
  - Range: 1–5
  - Mean: 4.21
  - SD: 0.61
  - No. of observations: 331
- Shared knowledge
  - Factor loading: 0.629
  - Range: 1–5
  - Mean: 3.93
  - SD: 0.59
  - No. of observations: 333
- Mutual respect
  - Factor loading: 0.659
  - Range: 1–5
  - Mean: 3.81
  - SD: 0.59
  - No. of observations: 327
- Frequency of communication
  - Factor loading: 0.566
  - Range: 1–5
  - Mean: 3.84
  - SD: 0.73
  - No. of observations: 334
- Timeliness of communication
  - Factor loading: 0.782
  - Range: 1–5
  - Mean: 4.08
  - SD: 0.62
  - No. of observations: 334
- Accuracy of communication
  - Factor loading: 0.796
  - Range: 1–5
  - Mean: 4.23
  - SD: 0.62
  - No. of observations: 333
- Problem-solving focus of communication
  - Factor loading: 0.784
  - Range: 1–5
  - Mean: 4.05
  - SD: 0.46
  - No. of observations: 320

Relational coordination index (α = 0.86)

Notes: Work practices, N = 9 hospital units. Variables coded from interviews with administrators. Relational coordination, N = 336 care providers. Variables coded from survey of care providers.

*These four items were dropped from the high-performance work practices index because of weak factor loadings.

rounds, probing to find out which functional groups participated in those rounds and the consistency of their participation. Rounds are the primary form of meeting used for coordinating patient care. These variables were coded on a 0–2 scale, with 0 indicating that the functional group did not participate in the rounds, 1 indicating that they participated sometimes, and 2 indicating that they participated usually or always.

Boundary spanner was measured by asking about the caseload and roles of the case managers who worked with joint replacement patients and whether the primary nursing model was in place on that unit (i.e., the practice of assigning one nurse to assume primary responsibility for a patient throughout his or her stay and to serve as a point person for coordinating that patient’s care). Caseload, the number of patients for whom case managers were typically responsible at a time, was measured as a continuous variable, ranging across hospitals from 6.7 to 40. Each of the case manager roles—leadership of rounds and planning for patient discharge—was coded as 0 or 1, with 0 indicating that the role was not expected and 1 indicating that it was expected of case managers. Primary nursing was coded as 1 if the model was in place and 0 if not.

Because these six work practices were correlated with one another, forming a “bundle” of work practices, we
combined the above measures into an index of high-performance work practices. Exploratory factor analysis suggested that these high-performance work practices can be characterized fairly well as a single factor. Nineteen of the original 23 items had factor 1 loadings greater than 0.40 and were retained; see Table 1 for factor loadings. Four items with loadings less than 0.40 were dropped, including cross-functional approach to utilization review (1 item), participation in nursing rounds (2 items), and coordination role for case managers (1 item). The eigenvalue for factor 1 was 8.53, and the eigenvalue for factor 2 was 3.08. Checking for cross-loadings, we found that 6 of the 19 variables in the high-performance work practices index also loaded onto factor 2 with loadings of 0.40 or higher. If we drop these six items from our high-performance work practices, our regression results remain virtually the same, with no changes in the significance level of our key independent variables and no change in the significance of mediation as measured by the Sobel test. We therefore elected to retain all 19 items.

All items in the high-performance work practices index had item-to-total correlation scores of 0.40 or greater, suggesting that our index meets standards for convergent validity. An additive scaling method was used in which each item that loaded onto factor 1 with loading of 0.40 or more was standardized with a mean of 0 and a standard deviation of 1 so that each item in the high-performance work practices index was equally weighted. A joint test for skewness and kurtosis indicated that normal distribution of the high-performance work practices index also could not be rejected (chi square 2.01, prob(chi square) = 0.3654). Cronbach’s alpha for the high-performance work practices index was 0.93, suggesting that this construct has a high level of reliability.

We selected an additive rather than a multiplicative approach for aggregating high-performance work practices into an index because the additive approach is more comprehensive, withstands missing human resource practices, and reflects the entire gestalt (Becker and Gerhart 1996, Delery 1998, Youndt et al. 1996). Moreover, additive models assume each practice is equally important within the index, an appropriate assumption for our study given that we have offered no hypotheses that indicate otherwise. A multiplicative approach is more appropriate when the practices together are expected to add up to more than the sum of the individual practices because of their fit with each other. Although this may be the case with the high-performance work practices presented here, the theoretical construct as developed thus far does not include explicit arguments regarding fit. As with other types of high-performance work practices, organizations can improve performance either by increasing the number of work practices they employ within the system or by using the practices within the system in a more comprehensive and widespread manner, for example, by extending their reach to cover a wider array of employee functions.

Table 1 shows that the high-performance work practices in this study do not cover all employee functions in an equally comprehensive way. We can see that physicians are less likely than nurses and therapists to be included in high-performance work practices. Our subsequent analyses therefore account for differences between functions.

Relational Coordination

Relational coordination was measured using the survey of care providers. Seven questions reflected the dimensions of relational coordination: the frequency of communication among care providers; the timeliness and accuracy of communication; the problem-solving nature of communication; and the degree to which relationships are characterized by shared goals, shared knowledge, and mutual respect.

Respondents from each of the functions believed to be most central to the care of joint replacement patients—physicians, residents, nurses, physical therapists, case managers, and social workers—were asked to answer each of the following questions with respect to each of the other functions.

- How frequently do you communicate with each of the groups about the status of joint replacement patients? (1 = never, 2 = rarely, 3 = occasionally, 4 = often, 5 = constantly)
- Do people in these groups communicate with you in a timely way about the status of joint replacement patients? (1 = never, 2 = rarely, 3 = occasionally, 4 = often, 5 = always)
- Do people in these groups communicate with you accurately about the status of joint replacement patients? (1 = never, 2 = rarely, 3 = occasionally, 4 = often, 5 = always)
- When an error has been made regarding joint replacement patients, do people in these groups blame others rather than sharing responsibility? (1 = never, 2 = rarely, 3 = occasionally, 4 = often, 5 = always)
- To what extent do people in these groups share your goals for the care of joint replacement patients? (1 = not at all, 2 = a little, 3 = some, 4 = a lot, 5 = completely)
- How much do people in these groups know about the work you do with joint replacement patients? (1 = nothing, 2 = little, 3 = some, 4 = a lot, 5 = everything)
- How much do people in these groups respect you and the work you do with joint replacement patients? (1 = not at all, 2 = a little, 3 = some, 4 = a lot, 5 = completely)

Exploratory factor analysis suggested that relational coordination is best characterized as a single factor. See Table 1 for factor loadings. The eigenvalue for this factor was 3.41, and the eigenvalue for factor 2 was 0.55.
An additive scaling method was used in which each item was standardized with a mean of 0 and a standard deviation of 1 so that each item was equally weighted. Cronbach’s alpha was 0.86, suggesting that this construct has a high level of reliability. No items were dropped due to weak factor loadings, and no cross-loadings greater than 0.40 were found. Furthermore, all items had item-to-total correlation scores of 0.40 or greater. We conclude that the relational coordination index meets standards for reliability and convergent validity.

Using one-way analysis of variance, significant cross-unit differences in relational coordination were found—$F(8,327) = 5.32$, $p < 0.001$—as well as significant cross-functional differences in relational coordination—$F(5,330) = 2.89$, $p < 0.05$. When unit-level and function-level differences were considered jointly, unit-level differences remained significant—$F(8,322) = 4.51$, $p < 0.001$—and function-level differences became insignificant—$F(5,322) = 1.75$, $p = 0.12$. To further assess treating relational coordination as a unit-level construct, we computed intraclass correlations ICC(1) and ICC(2). ICC(1) is the proportion of total variance explained by unit membership with values ranging from $-1$ to $+1$ and values between 0.05 and 0.30 being most typical. This number provides an estimate of the reliability of a single respondent’s assessment of the unit mean. ICC(2) provides an overall estimate of the reliability of unit means, with values equal to or above 0.70 being acceptable. For relational coordination, ICC(1) was 0.25 and ICC(2) was 0.81. We concluded that relational coordination performs well on both forms of intraclass correlation. Taken together, these results are consistent with treating relational coordination as a unit-level construct.

**Performance Outcomes**

Performance outcomes for this study included both the quality and efficiency of patient care. Hospitals have been striving to improve the quality of care as perceived by patients (Cleary et al. 1991). All hospitals in this study had been conducting patient surveys for years, but differences between their surveys required them to adopt a new survey for this study. We used a single item measure of patient-perceived quality of care (“Overall, how would you rate the care you received at the hospital?”), measured on a five-point Likert-type scale, consistent with other studies that have used single-item measures of patient-perceived quality of care (Ware and Hays 1988, Young et al. 2000, Rohrer and Wilkinson 2008). Responses were coded as 1 = poor, 2 = fair, 3 = good, 4 = very good, and 5 = excellent.

Hospitals have also been striving to improve the efficiency of care by reducing the lengths of patient stays. Length of stay is the number of inpatient days of care used by a given patient. Days of inpatient care are a resource that external payers are intent on reducing. This study therefore uses the length of hospital stay as a measure of the efficiency of care for each individual patient, controlling for the patient characteristics that are believed to necessitate longer lengths of stay (described below). Length of stay was calculated from hospital records for each patient as the number of whole days between the date of admission and the date of discharge.

**Control Variables**

**For Predicting Relational Coordination.** Control variables for predicting relational coordination include dummy variables that indicate the functional identity of the care provider respondent, given that different functions are expected to engage differently in relational coordination due to the differences in their professional identities and their differential coverage by high-performance work practices. Ideally, control variables would also include demographic characteristics such as tenure and gender that might influence care provider engagement in relational coordination; however, these variables were not included on the survey. We included the total number of joint replacements conducted by each unit in the six-month period prior to the study period to control for possible learning effects (Luft 1990) that could improve relational coordination between the functions involved in patient care.

**For Predicting Quality and Efficiency Outcomes.** Control variables for predicting quality and efficiency outcomes were selected to adjust for factors that have been shown in the health care literature to affect quality of care and length of stay for joint replacement patients. Control variables included the following patient characteristics: age, comorbidities, psychological well-being, preoperative status, surgical procedure (hip versus knee), marital status, race, and gender.

Patient age was determined from hospital records. Older patients were expected to require longer hospital lengths of stay. Preoperative clinical status was assessed in the patient survey using the pain and functioning elements of the WOMAC. Patients with lower preoperative status were expected to require longer lengths of stay. Comorbidities were assessed in the patient survey with a series of questions asking patients whether they suffered from heart disease, high blood pressure, diabetes, ulcer or stomach disease, kidney disease, anemia or other blood disease, cancer, depression, or back pain (Katz et al. 1996). Individual patients with a greater number of comorbid conditions were expected to require longer hospital lengths of stay.

Surgical procedure was measured through procedure code in the hospital record and was either a hip or a knee replacement. Knee replacements were expected to require longer lengths of stay than hips, due to greater difficulty of achieving postoperative mobility.

Psychological well-being was assessed in the patient survey using the mental health component of the SF-36
(Stewart et al. 1988). Patients with higher levels of psychological well-being were expected to report receiving higher quality of care: psychological theory suggests that people with high levels of positive affect tend to perceive experiences in a more favorable light. Patient gender, race, and marital status were determined through the patient survey and were included because some studies have found demographic influences on health care outcomes.

**Data Analyses**

To test Hypothesis 1, we regressed relational coordination \((n = 336\) care providers in 9 units) on the high-performance work practices index \((n = 9\) units), controlling for the functional identity of the care provider respondents (with “nurse” as the omitted respondent category) and for the volume of joint replacements conducted on the unit in the six-month period prior to the study.

To test Hypothesis 2, we regressed quality outcomes \((n = 588\) patients in 9 units) on the high-performance work practices index \((n = 9\) units), controlling for the patient characteristics expected to affect these outcomes, as well as the volume of joint replacements conducted on the unit in the six-month period prior to the study; we then aggregated relational coordination to the unit level \((n = 9\) units) and entered it along with the high-performance work practices index \((n = 9\) units) into the above equation for quality outcomes \((n = 588\) patients in 9 units).

To test Hypothesis 3, we regressed efficiency outcomes \((n = 599\) patients in 9 units) on the high-performance work practices index \((n = 9\) units), controlling for the patient characteristics expected to affect these outcomes, as well as the volume of joint replacements conducted by the unit in the six-month period prior to the study. We then aggregated relational coordination to the unit level \((n = 9\) units) and entered it along with the high-performance work practices index \((n = 9\) units) into the above equation for efficiency outcomes \((n = 599\) patients in 9 units).

We therefore test mediation in this study across multiple levels of analysis, consistent with previous studies of relational coordination (e.g., Gittell 2001, 2002b). Given its status as a multilevel theory that operates across multiple levels of analysis, relational coordination is particularly amenable to testing mediation across levels. If the coefficient on high-performance work practices becomes insignificant when relational coordination is added to the outcomes equations, this result can be taken to suggest that relational coordination mediates between high-performance work practices and outcomes, or in other words that high-performance work practices influence outcomes through their effect on relational coordination.

We used the Sobel test to determine whether the association between high-performance work practices and outcomes is reduced significantly when controlling for relational coordination, then drew on the critical values recommended by MacKinnon et al. (2002) to determine whether the results for quality and efficiency outcomes supported mediation.

For all the above analyses, random effects modeling was used to adjust standard errors for the multilevel nature of the data, accounting for nonindependence of the error terms (Raudenbush and Bryk 1992). To determine the days of hospital stay associated with a change in relational coordination, we conducted a Poisson random effects regression on the length of stay model.

**Findings**

Descriptive data and intercorrelations between key variables are reported in Table 2 in aggregate form, and broken out by individual hospital unit. Due to the high correlation found between high-performance work practices and relational coordination, we tested for multicollinearity in the outcomes models that include both high-performance work practices and relational coordination as independent variables by examining variance inflation factors. Evidence of multicollinearity exists if (1) the largest variance inflation factor is greater than 10, or (2) the mean value of all the variance inflation factors is considerably larger than 1, where 4.02 is given as an example of a variance inflation factor that is not considerably larger than 1 (Chatterjee and Price 1991). We found that the variance inflation factors for the quality of care model ranged from 1.06 to 8.45, with an average variance inflation factor of 2.46; for the length of stay model they ranged from 1.06 to 8.50, with an average variance inflation factor of 2.47. Comparing our results to the Chatterjee and Price criteria, we conclude that multicollinearity is not likely to be a substantial problem in our models.

**High-Performance Work Practices and Relational Coordination**

Hypothesis 1 test results are reported in Table 3. The results show that high-performance work practices are positively associated with relational coordination \((r = 0.31, p < 0.001)\). The physician respondent dummy variable was negative and significant \((r = -0.16, p < 0.001)\), suggesting that physicians were significantly less engaged in relational coordination than nurses. The other dummy variables were not significant, suggesting that residents, physical therapists, case managers, and social workers did not differ significantly from nurses in their engagement in relational coordination.

The estimated effect of high-performance work practices on relational coordination is statistically significant and moderately large. The standardized coefficient of 0.31 on high-performance work practices suggests that for a hospital at the mean level of
Table 3  Impact of High-Performance Work Practices on Relational Coordination

<table>
<thead>
<tr>
<th></th>
<th>Relational coordination</th>
</tr>
</thead>
<tbody>
<tr>
<td>High-performance work practices</td>
<td>0.31***</td>
</tr>
<tr>
<td>Physician respondent</td>
<td>-0.16***</td>
</tr>
<tr>
<td>Resident respondent</td>
<td>-0.02</td>
</tr>
<tr>
<td>Physical therapist respondent</td>
<td>0.07+</td>
</tr>
<tr>
<td>Case manager respondent</td>
<td>0.04</td>
</tr>
<tr>
<td>Social worker respondent</td>
<td>-0.07+</td>
</tr>
<tr>
<td>Surgical volume</td>
<td>-0.03</td>
</tr>
<tr>
<td>Constant</td>
<td>0.03</td>
</tr>
<tr>
<td>Within-unit $R^2$</td>
<td>0.07</td>
</tr>
<tr>
<td>Between-unit $R^2$</td>
<td>0.90</td>
</tr>
<tr>
<td>No. of observations</td>
<td>336</td>
</tr>
</tbody>
</table>

Notes. Unit of analysis is care provider (physicians, residents, nurses, physical therapists, social workers, and case managers) assigned to work with joint replacement patients ($n = 336$). Nurse respondent is the omitted category. Random effects regression is used to account for clustering of care providers by hospital unit ($n = 9$). High-performance work practices and surgical volume are entered at the hospital unit level ($n = 9$). All coefficients are standardized.

$p < 0.10$; $^*p < 0.05$; $^**p < 0.01$; $^***p < 0.001$.

relational coordination, a one-point change in high-performance work practices would correspond to a 31% change in relational coordination. Because the primary explanatory variable—high-performance work practices—is measured at the unit level, the equations explain relatively little within-unit variation in relational coordination ($R^2 = 0.07$), but they explain a large percentage of between-unit variation in relational coordination ($R^2 = 0.90$). These results support our argument that high-performance work practices positively predict relational coordination (Hypothesis 1).

High-Performance Work Practices, Relational Coordination, and Quality Outcomes

Results from testing Hypothesis 2 are shown in Table 4, columns 1–3. Results indicate that high-performance work practices are associated with higher quality of care ($r = 0.38$, $p < 0.001$) (column 1). When relational coordination is aggregated to the unit level and included in the equation (column 3), relational coordination is associated with higher quality of care ($r = 1.93$, $p = 0.041$), and the coefficient on high-performance work practices becomes insignificant, suggesting mediation.

Again, the estimated effects are statistically significant and moderately large to large. The nonstandard-
Table 4  Impact of High Performance Work Practices and Relational Coordination on Quality and Efficiency Outcomes

<table>
<thead>
<tr>
<th></th>
<th>Patient-perceived quality of care</th>
<th>Patient length of stay</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1a</td>
<td>1b</td>
</tr>
<tr>
<td>High-performance work practices</td>
<td>0.38***</td>
<td>0.00</td>
</tr>
<tr>
<td>Relational coordination</td>
<td>1.94***</td>
<td>1.93*</td>
</tr>
<tr>
<td>Patient age</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>Preoperative functioning</td>
<td>−0.00</td>
<td>−0.00</td>
</tr>
<tr>
<td>Comorbidities</td>
<td>0.05</td>
<td>0.06</td>
</tr>
<tr>
<td>Surgery type (hip = 1)</td>
<td>0.22**</td>
<td>0.23**</td>
</tr>
<tr>
<td>Psychological well-being</td>
<td>0.15**</td>
<td>0.15**</td>
</tr>
<tr>
<td>Marital status (married = 1)</td>
<td>0.12</td>
<td>0.14</td>
</tr>
<tr>
<td>Gender (female = 1)</td>
<td>−0.07</td>
<td>−0.07</td>
</tr>
<tr>
<td>Race (black = 1)</td>
<td>0.13</td>
<td>0.13</td>
</tr>
<tr>
<td>Surgical volume</td>
<td>0.00+</td>
<td>0.00+</td>
</tr>
<tr>
<td>Constant</td>
<td>3.07***</td>
<td>−4.81***</td>
</tr>
<tr>
<td>Within-unit $R^2$</td>
<td>0.05</td>
<td>0.05</td>
</tr>
<tr>
<td>Between-unit $R^2$</td>
<td>0.64</td>
<td>0.73</td>
</tr>
<tr>
<td>Chi square</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>No. of observations</td>
<td>588</td>
<td>588</td>
</tr>
</tbody>
</table>

Notes. Unit of analysis is the joint replacement patient ($n = 588$ for quality of care, $n = 599$ for length of stay). Random effects regression is used to account for clustering of patients by hospital unit ($n = 9$). High-performance work practices, relational coordination, and surgical volume are entered at the hospital unit level ($n = 9$).

$^{*}p < 0.10; ^{*}p < 0.05; ^{**}p < 0.01; ^{** *}p < 0.001.$

The standardized coefficient of 0.38 on high-performance work practices suggests that for a hospital at the mean level of quality, a one-point change in high-performance work practices would correspond to a 0.38-point change in patient-perceived quality of care. The coefficient of 1.93 on relational coordination suggests that for a hospital at the mean level of quality, a one-point change in relational coordination would correspond to a 1.93-point change in patient-perceived quality of care. Because the primary explanatory variables—high-performance work practices and relational coordination—are measured at the unit level, the equations explain little within-unit variation in quality of care ($R^2 = 0.05$), but they explain a large percentage of between-unit variation in quality of care ($R^2 = 0.73$ for the most complete model).

Results of the Sobel test suggest that the association between high-performance work practices and quality of care is significantly mediated by relational coordination ($z = 1.87$, $p < 0.01$). Together, these results suggest that high-performance work practices predict quality outcomes and that they do so by strengthening relational coordination among employees in different functions (Hypothesis 2).

High-Performance Work Practices, Relational Coordination, and Efficiency Outcomes

Results from testing Hypothesis 3 are shown in columns 4–6 of Table 4. Findings indicate that high-performance work practices are associated with shorter lengths of stay ($r = −0.16$, $p = 0.001$). When relational coordination is aggregated to the unit level and included in the equation (column 6), relational coordination is associated with shorter lengths of stay ($r = −1.19$, $p = 0.005$); the coefficient on high-performance work practices becomes insignificant, again suggesting mediation.

The coefficient of −0.16 on high-performance work practices suggests that a one-point increase in high-performance work practices is associated with a 0.16-day reduction in patient length of stay. The coefficient of −1.19 on relational coordination suggests that a one-point increase in relational coordination is associated with a 1.2-day reduction in patient length of stay.
Figure 1  Relational Model of How High-Performance Work Systems Work

![Diagram](image-url)

U.S. hospitals, the median for the average charge per day was $4,357 in 2006 (Medicare Cost Reports 2006), or $4,803 in 2008, adjusted for annual health care cost increases of 4.5% in 2007 and 5.5% in 2008. So a one-point increase in relational coordination is associated with $5,764 ($4,803/day * 1.2 days) in average cost savings for each joint replacement patient served. Results of the Sobel test suggest that the association between high-performance work practices and length of stay is significantly mediated by relational coordination (z = 2.40, p < 0.01). Together, these results suggest that high-performance work practices predict efficiency outcomes and that they do so by strengthening relational coordination among employees in different functions (Hypothesis 3). See Figure 1 for a summary of all results.

**Discussion**

In this paper we explored a relational pathway through which high-performance work systems were predicted to contribute to performance outcomes. We proposed that high-performance work practices can enhance organizational performance by encouraging the development of relational coordination between employees who perform distinct functions—in contrast to traditional bureaucratic work practices that divide and separate employees and in contrast to other types of high-performance work practices that focus primarily on the development of employee skills and commitment. High-performance work practices that focus only on employee skills and commitment are not expected, on their own, to yield the coordinated, synergistic behaviors that are needed to achieve the highest levels of performance in interdependent work settings.

**Contributions**

This study has made two key contributions. First, we have linked the high-performance work systems literature to postbureaucracy theory by articulating the potentially positive role of formal work practices. Postbureaucracy theorists (e.g., Heckscher 1994, Piore 1993) argue that the networks needed for getting work done tend to emerge informally and that formal organizational practices, traditionally designed to segment and divide employees from their counterparts in different functions, serve more as obstacles than facilitators of these networks. Along with other recent work (Collins and Clark 2003, Gant et al. 2002, Leana and Van Buren 1999, Vogus 2006), our study provides a countervailing argument that formal practices are not necessarily obstacles and can indeed be designed to encourage the development of relationships between employees in different functions, producing significant performance advantages for organizations. Of the existing research on high-performance work systems, Collins and Clark’s (2003) study is the most similar to ours. Like us, Collins and Clark conceptualize relationships as mediators between human resource practices and performance. Despite that similarity, our work differs from that of Collins and Clark both theoretically and methodologically. Theoretically, we focus on relationships between employees in different functions rather than on business relationships more generally. Furthermore, our theory building is focused at the level of production or service delivery rather than of relationships among top managers, because of our interest in the coordination of work. Methodologically, we differ from Collins and Clark by using multiple data sets to test our hypotheses. Collins and Clark interviewed CEOs to determine human resource practices, social networks, and performance, thus introducing the potential for biases that can arise when relying on a single source of data; in contrast, we interviewed front-line managers to determine human resource practices, surveyed direct service workers to determine relational coordination, and examined customer data to determine performance outcomes. Because of these theoretical and methodological differences from
previous work, our study uniquely demonstrates how formal work practices play an important role in producing high performance in multidisciplinary work groups that are engaged in interdependent work.

A second contribution of this study is that we articulate a novel relational pathway through which high-performance work practices contribute to performance. We have argued that high-performance work practices can contribute to performance by supporting the development of relational coordination, “a mutually reinforcing process of interaction between communication and relationships carried out for the purpose of task integration” (Gittell 2002a, p. 301). Like the role-based coordination found in Thompson (1967) and Beachy (2006), and like role-based relationships more generally as explored by Meyerson et al. (1996) in their work on swift trust and by Klein and coauthors (2006) in their work on de-individualization, relational coordination focuses on relationships between roles rather than individual role inhabitants. Although there are other relational perspectives on coordination (Becky 2006, Faraj and Sproull 2000, Weick and Roberts 1993), the theory of relational coordination is unique in identifying specific dimensions of relationships that are integral to the coordination of interdependent work, while focusing on the development of these relationships between roles rather than individuals. By showing that relational coordination constitutes a pathway between high-performance work practices and outcomes, our study provides a new relational model of how high-performance work systems work.

Limitations

Despite its contributions and strengths, this study is limited in several ways. First, this study is limited by the use of interviews rather than survey instruments to measure work practices, rendering the results less amenable to replication because of the time-consuming process of conducting interviews and constructing variables. Second, our data are limited by the lack of measures for individual skill and commitment. We have counterbalanced this omission by arguing that individual skill and commitment are not sufficient to yield the coordinated, synergistic behaviors needed to achieve the highest levels of performance in interdependent work settings. Although this study has identified a unique and important mechanism—relational coordination—through which high-performance work systems work in such settings, we recommend that future studies explore the interplay among skill, commitment, and relational coordination.

A third limitation of our data is the lack of employee-level control variables other than the functional identity of the respondent. We have fairly extensive demographic information for our patient respondents but no demographics other than functional identity for the care providers who responded to our survey. The omission of care provider demographics from the model that predicts relational coordination among care providers may result in omitted variable bias. Finally, our focus on cross-functional relationships pays less attention to the within-function relationships that have also been shown to be important (Vogus 2006).

Future Research

Next steps in theory development should include the development of high-performance work system models that include all three causal mechanisms—skills, commitment, and employee-employee relationships. Others have begun to take steps in this direction. Smith et al. (2005) developed a model that explores the contribution of human capital and social capital to perceived knowledge-creation capability in technology firms, based on the argument that one without the other is not very useful. Leana and Pil (2006) developed and tested a similar model in the context of public schools. But to our knowledge, no one has yet explored the high-performance work systems that would support the development of skills, commitment, and employee-employee relationships. We believe that the next frontier for theories of high-performance work systems is the design of work systems that explicitly support the development of all three pathways, and we hope that this paper, by further explicating the relational path through which high-performance work systems work, will serve as a building block in that direction.

Conclusion

In conclusion, this study suggests that adopting high-performance work practices to foster relational coordination constitutes one viable path for improved organizational performance. But organizations have other options when choosing paths for improving performance. What are the relative advantages of the relational approach explored here? Relational coordination enables employees to more effectively coordinate their work with each other, thus pushing out the production possibilities frontier to achieve higher-quality outcomes while using resources more efficiently—for example, as we found here, enabling hospital workers to achieve better patient-perceived quality of care along with shorter patient lengths of stay. Relational coordination and the high-performance work practices that support its development are therefore particularly relevant in industries that must maintain or improve quality outcomes while responding to cost pressures. In an increasingly competitive economy, nearly all industries are likely to face this dual challenge.

Second, unlike relationships that are based on personal ties, the relationships found in relational coordination are based instead on ties between roles. The high-performance work practices explored in this paper are
expected to foster relationships of shared goals, shared knowledge, and mutual respect among employees whose work is interdependent, with or without the presence of personal ties. This feature allows for the interchangeability of employees, allowing employees to come and go without missing a beat, an important consideration for organizations that strive to achieve high levels of performance while allowing employees the scheduling flexibility to meet their outside commitments. Role-based relationships may require greater organizational investments to foster than personal ties—for example, designing cross-functional boundary spanner roles and cross-functional performance measurement systems versus hosting after-work parties—but they are also more robust to staffing changes that occur over time. High-performance work systems that foster these role-based relationships may therefore provide organizations with a relatively sustainable source of competitive advantage.

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